



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/530,475

04/06/2005

Masahide Kawayaya

050179

4981

23850

7590

02/13/2008

KRATZ, QUINTOS & HANSON, LLP

1420 K Street, N.W.

Suite 400

WASHINGTON, DC 20005

EXAMINER

RODGERS, COLLEEN E

ART UNIT

PAPER NUMBER

2813

MAIL DATE

DELIVERY MODE

02/13/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/530,475

Applicant(s)

KAWARAYA ET AL.

Examiner

Colleen E. Rodgers

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15 and 17-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15 and 17-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(c) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 20 December 2007 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 15 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Muramatsu** (US Patent Application Publication 2002/0002112) in view of **Hashimoto et al** (USPN 5,955,198) and **Akui et al** (US Patent Application Publication 2002/0042343).

Regarding claim 15, **Muramatsu** discloses a photoelectrode for dye-sensitized solar cells, comprising a porous titanium oxide film [see paragraphs 0008, 0038] formed on an electrically conductive transparent layer [see paragraph 0039] formed on a film.

Muramatsu does not disclose wherein the electrically conductive transparent layer is formed on a transparent high polymer, but rather discloses wherein the electrically conductive transparent

layer is formed on a glass base plate. **Hashimoto et al** disclose a base plate 1 over which an electrically conductive transparent layer 3 is formed, wherein the base plate may be formed of glass or a transparent high polymer [see col. 1, lines 20-27]. Furthermore, **Akui et al** teach forming a porous titanium oxide film over a transparent substrate, wherein the substrate may be formed of any material that withstands the heat of processing, including glass or plastic [see **Akui et al**, paragraph 0048]. It would have been obvious to one of ordinary skill in the art at the time of invention to use a high polymer for the base plate because they are art-recognized equivalents, and furthermore it has been held that simple substitution of one known material for another to obtain predictable results is obvious. See *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007).

Muramatsu also does not disclose wherein the porous titanium oxide film is obtained by a process comprising the steps of: applying a titanium oxide particle dispersion liquid in methanol and/or ethanol to the surface of the electrically conductive transparent layer by spray coating in such a manner than the atomized droplets of the dispersion liquid discharged from the spray coater have a mean diameter of about 1 μm to about 25 μm ; and drying the coating by heating at a temperature of about 130°C to about 180°C or by irradiation with electromagnetic waves to form a porous titanium oxide film. However, the limitations regarding the method by which the porous titanium oxide film is formed carry little patentable weight in a device claim. The method carries patentable weight in this scenario only insofar as it limits the final product, which in this case is very little. Nonetheless, **Akui et al** teach forming a porous titanium oxide film over a transparent substrate, wherein the porous titanium oxide film is obtained by a process comprising the steps of:

applying a titanium oxide particle dispersion liquid in methanol and/or ethanol to the surface of the electrically conductive transparent layer by spray coating [see paragraphs 0033, 0037 and 0047]; and

drying the coating by heating to form a porous titanium oxide film [see paragraph 0049].

While **Akui et al** do not disclose that the atomized droplets of the dispersion liquid discharged from the spray coater have a mean diameter of about 1 μm to about 25 μm , nor wherein the coating is heated at a temperature from about 130°C to about 180°C, these limitations are *prima facie* obvious without a showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art in general conditions is obvious). In this case, there exists no evidence of record that the mean diameter of the atomized droplets or the heating temperature provide unexpected results in the porous titanium oxide film produced. One of ordinary skill in the art would be motivated to optimize the mean diameter of the atomized droplets or the heating temperature to provide for processing limitations, particularly the atomizing characteristics of the selected spray coater and the required temperature to remove the chosen solvent and to cause as little harm as possible to the chosen substrate material. Furthermore, the instant specification provides no guidance as to the reason either of these quantities is critical. Specifically, the instant specification merely requires a mean diameter of the atomized droplets to be “about 30 μm or less” [see, for instance, the Abstract], and requires a heating temperature for a high polymer substrate “of about 200°C or lower,” which is disclosed by **Akui et al** [see paragraph 0049].

Regarding claims 17 and 18, the prior art of **Muramatsu, Hashimoto et al** and **Akui et al** disclose the photoelectrode according to claim 15. Furthermore, **Akui et al** disclose wherein the porous titanium oxide film is a porous anatase-type titanium oxide film formed with anatase-style titanium oxide particles [see paragraph 0037].

Regarding claim 19, the prior art of **Muramatsu, Hashimoto et al** and **Akui et al** disclose the photoelectrode according to claim 15. Furthermore, **Akui et al** disclose wherein the titanium oxide particle dispersion liquid has a solids content of about 10 wt% to about 80 wt%, which overlaps the claimed about 1 wt% to about 40 wt% [see paragraph 0040].

Regarding claim 20, the prior art of **Muramatsu, Hashimoto et al** and **Akui et al** disclose the photoelectrode according to claim 15. None of **Muramatsu, Hashimoto et al** and **Akui et al** disclose the viscosity of the titanium oxide particle dispersion liquid. However, this claim is *prima facie* obvious without a showing that the claimed range achieves unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art in general conditions is obvious). In this case, there exists no evidence of record that the viscosity of the dispersion liquid provides unexpected results in the porous titanium oxide film produced. One of ordinary skill in the art would be motivated to optimize the viscosity of the dispersion liquid to provide for processing limitations, particularly the atomizing characteristics of the selected spray coater and the chosen solvent and solids content.

4. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Muramatsu** (US Patent Application Publication 2002/0002112) in view of **Hashimoto et al** (USPN 5,955,198) and **Akui et al** (US Patent Application Publication 2002/0042343) as applied to claims 15 and 17-20 above, and further in view of **Kawazu et al** (US Patent Application Publication 2002/0186469). As above, limitations regarding the method by which the porous titanium oxide film is formed carry little patentable weight in a device claim. The method carries patentable weight in this scenario only insofar as it limits the final product, which in this case is very little. Nonetheless, while none of **Muramatsu**, **Hashimoto et al** and **Akui et al** disclose wherein the coating is dried by microwave irradiation, **Kawazu et al** disclose drying a coating with microwave irradiation [see paragraph 0014]. It would have been obvious to one of ordinary skill in the art at the time of invention to use the drying method of **Kawazu et al** in the process disclosed mainly by **Akui et al** because the method beneficially promotes polarization in the film by completely depositing particles [see paragraph 0019].

Response to Arguments

5. Applicant's arguments with respect to claims 15 and 17-21 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colleen E. Rodgers whose telephone number is (571) 272-8603. The examiner can normally be reached on Monday through Friday, 8:00 AM to 5:00 PM.

Art Unit: 2813

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/C. E. R./
Examiner, Art Unit 2813

/Carl Whitehead Jr./
Supervisory Patent Examiner, Art Unit 2813